AOIT Computer Networking

Lesson 5

Network Components

Student Resources

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Student Resource 5.1

Worksheet: Network Infrastructure Analogy

Student Names:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_

Directions: The paragraphs below describe the roles of each main network component as if it were a person or an object in a city. Read each description and brainstorm with a partner to identify the main idea, and then describe the object’s main function, using a few words or a short phrase. The first two are completed for you as an example.

Introduction to Network Infrastructure

The way a network is set up is called its *network infrastructure*, or *architecture*. Like a city full of different residents and modes of transportation, the network uses many different kinds of components to make sure that messages travel smoothly and quickly to their destinations.

* I am the town gossip. When I get information from one source on the network, I tell everyone else. One of my biggest weaknesses is that I’m illiterate, so I can’t read addresses. When I get a message, I can’t tell who it’s for, so that’s why I send it to everyone in the group.   
  **Description**: *Broadcasts messages to everyone*
* My name is Nic, and I am an intelligent citizen and homeowner. I have my own address that no one else shares, and any time I send and receive messages, they are stamped with this address.   
  **Description**: *Sends and receives messages to and from a unique address*
* I am one of the city’s pet parrots. City officials can’t yell loud enough to hear each other on opposite sides of the room, so we *parrots sit between desks and repeat the messages very lo*udly. I’m not smart enough to know what the words mean, but I can mimic the message very well, so the officials can communicate.  
  **Description**:
* I am the postal worker you trust to deliver your letters and bills. Like the town gossip, I know everything that goes on, but I’m smart enough to read addresses, organize messages, and send messages only to the right people.   
  **Description**:
* I’m the guard at the gate of the city. When we get visitors, I can check their passports and IDs to make sure they’re allowed inside and send them to the places they’re trying to go. When townspeople want to leave, I tell them the fastest way to the next place they’re going.  
  **Description**:
* I’m a city guard who can also translate different languages. When new messages in foreign languages come in, I translate them so that the people in the city don’t have to worry about understanding many languages and customs.  
  **Description**:

Student Resource 5.2

Puzzle: Network Components

Student Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_

Directions: The following puzzle is filled with the comparisons between a city and a network that you read about in the first activity. The table will help you understand how the residents of a city parallel network components. Using your notes, fill in the missing information to complete each comparison. The first is done as an example, and clues are sprinkled throughout to help you.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **The Component/Person** | **Shared Function** | **The Place** |
| 1 | A network interface card | Uses a unique address | On the network |
| A citizen | In the town |
| 2 | A hub |  |  |
| A town gossip | In his neighborhood |
| 3 |  | Repeats a signal | Across cables |
| A city parrot |  |
| 4 | A switch | Delivers messages to a specific address |  |
|  |  |
| 6 |  |  | At the edge of the local network |
| A city guard |  |
| 7 |  | Translates messages | Between networks using different protocols |
|  |  |

Student Resource 5.3

Worksheet: Scavenger Hunt

Student Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_

Directions: The following network components are all used to connect computers on a network, but each performs a slightly different function and serves a different need. Research each of the following network components using the websites listed on the next two pages. Take notes on the sheet below or create your own table in your notebook. An example is given.

| Network component | What does it look like? How does it connect cables and computers? | What is its main function? | How intelligent is it, or what other features does it have? |
| --- | --- | --- | --- |
| **Network interface card** | Circuit board attached inside computer. Hasone Ethernet port thatallows user to plug in a twisted-pair cable to connect to the network. | Allows one computer to connect to a network via the Ethernet port; offers the network a unique address. | Has its own physical, unique network address, called aMAC address. |
| **Repeater** |  |  |  |
| **Hub** |  |  |  |
| **Switch** |  |  |  |
| **Router** |  |  |  |
| **Gateway** |  |  |  |

Scavenger Hunt Resources

Here are some useful websites to help you learn about network components.

**Network Interface Card (NIC) or Network Adapter Card**

* “Guide to Network Components.” FreePCTech,   
  <http://freepctech.com/pc/002/networks002.shtml>
* “What Is a Network Interface Card?” wiseGeek,   
  <http://www.wisegeek.com/what-is-a-network-interface-card.htm>
* “Network Interface Controller.” Wikipedia, <http://en.wikipedia.org/wiki/Network_interface_controller>

**Repeaters**

* “Network Devices.” Computer Technology Documentation Project, <http://www.comptechdoc.org/independent/networking/guide/netdevices.html>
* Mitchell, Bradley. “Repeater.” About.com, <http://compnetworking.about.com/cs/internetworking/g/bldef_repeater.htm>

**Hubs**

* Mitchell, Bradley. “Ethernet Hub.” About.com, <http://compnetworking.about.com/cs/internetworking/g/bldef_hub.htm>

**Switches**

* “Network Switch.” Wikipedia, <http://en.wikipedia.org/wiki/Network_switch>
* Mitchell, Bradley. “Network Switch.” About.com, <http://compnetworking.about.com/od/hardwarenetworkgear/g/bldef_switch.htm>
* “What Is the Difference between an Ethernet Hub and Switch?” Dux Computer Digest, <http://www.duxcw.com/faq/network/hubsw.htm>

**Routers**

* TechWeb TechEncyclopedia, <http://www.techweb.com/encyclopedia/>
* “Network Router.” Javvin Company, <http://www.javvin.com/etraffic/network-router.html>

**Gateway**

* TechWeb TechEncyclopedia, <http://www.techweb.com/encyclopedia/>
* “Gateway.” Webopedia, <http://www.webopedia.com/TERM/g/gateway.html>

Student Resource 5.4

Worksheet: Network Scenarios

Student Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_

Directions: Network administrators face many different kinds of situations when setting up a network. Which components are used to set up a network depends on the size of the network and the needs of its users. Read each of the scenarios below and identify which component the network administrator should use to solve the network problem described. You can choose from the following list of components:

|  |  |  |
| --- | --- | --- |
| * Repeater/booster | * Hub | * Switch |
| * Gateway | * Router |  |

Scenario 1

You are the new IT person for a small charter school that has a new computer lab. The lab has 30 desktop computers, and students will be working separately on these computers. They are expected to perform Internet research, watch videos, and check their email.

How will you connect computers so that they all have a speedy Internet connection?

ANSWER:

Scenario 2

You are a college student setting up a home network for yourself and your housemates. You want to be able to share files among five computers and allow all computers to access the Internet. You also want to be sure that you have network security precautions, such as a firewall, in place.

Which component will you install so that you can share files and access the Internet, yet protect your home computers?

ANSWER:

Scenario 3

You live far up in the mountains and can’t get a regular Internet service provider to run cable up to serve your area. You and your neighbor have decided that the best way to get Internet access is to share the cost of a satellite Internet connection. However, this involves running cables from your house, where the satellite is, to your neighbor’s house. Your major problem is that the distance between your houses is longer than the maximum length that an Ethernet cable can carry a signal. If you run such a long cable, the signal will get weak (degrade or attenuate), and your neighbor won’t be able to send and receive data.

Which network component will you use to make sure the signal clearly reaches your neighbor’s house?

ANSWER:

Scenario 4

You are setting up a small local area network in your home so that you can share some family photos and school assignments with your parents. You want to be able to hook up your parents’ computer, your computer, and your little sister’s computer to the network all at the same time. Your parents don’t want to spend a lot of money, either.

Which component will best hook up all three computers to let you share some files, but not cost much?

ANSWER:

Scenario 5

You are the new IT manager for a medium-sized company that has some old, legacy computer systems as well as new, state-of-the-art systems. The new systems use the IP standard to communicate, but the old systems use different protocols such as AppleTalk, which was used on old Macintosh computers.

Which component can you install that can translate between all these different computer languages and allow your computers to communicate?

ANSWER:

Student Resource 5.5

Assignment Sheet:   
Network Components Poster and Presentation

Directions: With your team, develop a poster about your assigned network component, and prepare to present your poster to the class. Use all of your worksheets and notes from this lesson to complete the poster and presentation. Review the assessment criteria before you begin work.

Make sure each member of your group is responsible for some aspect of the poster and presentation—such as writing, drawing, or making the final oral presentation to the class.

Poster

Create a poster about your network component and include the following:

* A title
* A visual representation of the component—either a drawing or a picture
* A diagram of how the component connects the computers on a network
* A short, one-sentence description of what the component does
* A short, written list of advantages and disadvantages of the network component

Presentation

Imagine you are consultants making a proposal to the person setting up the network described in your scenario. You have just three minutes to present your proposal to answer the question posed in the network scenario. Use these guidelines to prepare your presentation:

* Provide a clear answer to the scenario question.
* Explain how the network component that you are featuring solves the problem in the scenario.
* Explain the advantages and disadvantages of the solution you are proposing.
* Provide any additional information that might help the person setting up the network make a decision.
* Refer to your poster to back up what you say.

Make sure your assignment meets or exceeds the following assessment criteria:

**Poster**

* The poster features an accurate visual representation of the component and shows how it connects computers.
* The poster’s text accurately describes what this network component does.
* The poster’s text accurately lists the advantages and disadvantages of the network component.
* The poster is neat and presentable. All text is legible, with proper spelling and grammar.

**Presentation**

* All content is accurate and complete and communicates an understanding of the topic.
* All of the material in the presentation is relevant to the topic of the presentation.
* The presentation is at the appropriate volume and speed and has no mispronunciations.
* The presentation is prepared and rehearsed; all group members who present know their part.
* The question/answer session following the presentation shows knowledge of the component presented.